On the Botany of Raoul Island, one of the Kermadec group in the South Pacific Ocean. By J. D. Hooker, Esq., M.D. F.R.S., F.L.S. &c.

[Read April 1st, 1856.]

The materials from which the following sketch is drawn up consist of a small collection of plants made upon Raoul Island, by Mr. M'Gillivray, late Naturalist to H.M.S. *Herald*, under the command of Captain Denham, R.N., who forwarded the collection in question to Sir W. Hooker; and whose zealous exertions in furthering the scientific objects of the expedition under his command demand the grateful acknowledgement of all classes of naturalists.

Very little being known of the Kermadec group, I applied to Captain Washington, R.N., the present able and assiduous Hydrographer to the Admiralty, who promptly forwarded me the following information.

The name of Kermadec Islands was first given, in the chart accompanying Admiral Rossel's account of D'Entrecasteaux's voyage in search of La Peyrouse, to a group situated about 450 miles N.E. of New Zealand, between that group and the Fijis. They consist of four principal islands, Macauley and Curtis Islands, discovered before D'Entrecasteaux's visit, by Lieutenant Watts in the *Penrhyn* in 1788, and Raoul and Esperance Islands, by D'Entrecasteaux on March 15th, 1793.

Raoul, or Sunday Island, is described both by D'Entrecasteaux (vol. i. 295) and D'Urville (Voy. de l'Astrolabe, iii. 7) as triangular, and not more than four leagues in circumference, forming a high, rugged, steep mountain covered with wood. Commodore Wilkes, who afterwards visited it, adds that it appears to be volcanic, and that its rocks rise like basaltic columns.

Captain Denham in H.M.S. *Herald* finished the survey of this island on July 24th, 1854, and reports that "it is in lat. 29° 15′ 30″ S., long. 177° 54′ 52″ W., and that its maximum altitude is 1627 feet." Its only inhabitants consist of a family from New York, to whose humane disposition he is indebted, under the trying circumstances of having to inter his son close to their settlement. Poultry, vegetables and water can be procured there during the summer.

Some further information regarding Raoul Island is given by Mr. Milne (Botanical Collector to the Expedition) in Hooker's 'Journal of Botany' (vii. 151), where the luxuriance of the Cryptogamic vegetation is particularly alluded to, and the pre-

sence of a Palm and some *Orchideæ*, of which, however, no specimens have hitherto been transmitted.

Macauley and Curtis Islands are very much smaller, and L'Esperance is a mere rock.

The most interesting circumstance connected with the vegetation of Raoul Island is the identity of most of the flowering plants, and all but one of the ferns, that have been collected upon it, with those of New Zealand. The great extent of intervening ocean (450 miles), and the small size of the islands, would appear to render it extremely difficult to account for this similarity of vegetation by transport; added to which, the prevailing winds blow from the north-west, and the oceanic currents set in the same direction.

It is also worthy of remark, that of the nine species that are not natives of New Zealand, four are new, and three of these are nearly allied to New Zealand plants; whilst of those five that are not new, three are widely diffused throughout the tropical and subtropical Pacific islands, and would appear not to be capable of enduring the cold of New Zealand; these are the *Metrosideros polymorpha*, *Piper latifolium*, and *Omalanthus nutans*.

The absence of any Ferns (with a single exception) but such as are natives of New Zealand, is, however, a far more striking fact, both because the list is a large one for so small an island (twenty-two species), and because, if their presence is to be accounted for wholly by trans-oceanic transport of these species, the question at once occurs, why has there been no addition of some of the many Fiji or New Caledonian Island ferns, that are common tropical Pacific species, the Fiji Islands being only 700 miles north of the Kermadecs, and New Caledonia 750. The only fern which is not a native of New Zealand, is the Norfolk Island *Asplenium difforme*.

Still more remarkable is the total absence in the collection of any of the plants peculiar to Norfolk Island, for Raoul Island is in the same latitude as Norfolk Island, is exactly the same distance from New Zealand, and the winds and currents set from Norfolk to Raoul Island: in short, though the northern extreme of New Zealand, Norfolk Island and Raoul Island form an equilateral triangle, with the exception of *Asplenium difforme*, there is not a single fern of Norfolk Island found in Raoul Island that is not also found in New Zealand; whilst of the twenty flowering plants of Raoul Island, no less than six are absolutely peculiar to New Zealand and Raoul Island, and with the excep-

tion of the tropical, widely diffused Pacific species, there are no phænogamic plants or ferns confined to Norfolk Island and Raoul Island. It is further remarkable that of the Raoul Island ferns, *Cyathea medullaris* and *Pteris falcata* have not been found in Norfolk Island.

There is no doubt that a complete flora of Raoul Island would modify these results; but there can also be no doubt that it would confirm these indications of its affinities being most strong with that of New Zealand, and feeble to a very unaccountable degree with the floras of those other groups with which it might be expected to possess a very strong relationship.

Of the twenty flowering plants, three are noticed by the collector as being possibly introduced by man, viz. *Sicyos angulatus*, *Gnaphalium luteo-album*, and *Oplismenus æmulus*, all of which were found to affect cultivated ground. These are, however, so widely distributed in the South Pacific Islands, New Zealand, and Australia, that it is quite as probable as not that they are truly wild in the Kermadec group, and only grow in more abundance upon prepared soil. All have, however, appendages that would favour their transport, as the glochidiate setæ of the fruit of the *Sicyos*, the awn of the glume of *Oplismenus*, and the pappus of *Gnaphalium*.

With regard to the remaining seventeen flowering plants, I recognize special adaptations for transport in the following two only:—*Bidens leucantha**, in the barbed setæ of the fruit, and *Lagenophora petiolata*, in the viscid fruit. Of the rest none seem in any way adapted for transport, unless the minute and numerous seeds of the *Lobelia*, *Acianthus*, and *Metrosideros* be so regarded.

Dicotyledones.

1. Coriaria ruscifolia, *L.*
2. Metrosideros polymorpha, *Gaud.*
3. Sicyos angulatus, *L.*
4. Coprosma petiolata, *n. sp.*
5. Coprosma acutifolia, *n. sp.*
6. Panax arboreum, *Forst.*
7. Lagenophora petiolata, *H. f.*
8. Bidens leucantha, *Willd.*
9. Gnaphalium luteo-album, *L.*
10. Scævola gracilis, *n. sp.*
11. Lobelia anceps, *Thunb.*
12. Veronica parviflora, *Vahl.*
13. Myoporum lætum, *Forst.*
14. Omalanthus nutans, *Guill.*
15. Piper latifolium, *Forst.*
16. Peperomia Urvilleana, *A. Rich.*
17. Ascarina lanceolata, *n. sp.*

* This, though not included in the New Zealand flora, has been latterly introduced into the neighbourhood of Auckland, &c.

Monocotyledones.

18. Acianthus Sinclairii, *H. f.*
19. Isolepis nodosa, *R. Br.*
20. Oplismenus æmulus, *R. Br.*

Filices & Lycopodiaceæ.

21. Cyathea medullaris, *Sw.*
22. Hymenophyllum demissum, *Sw.*
23. Adiantum hispidulum, *Sw.*
24. Pteris falcata, *R. Br.*
25. Pteris aquilina, *L.*, *var.* esculenta.
26. Pteris comans, *Forst.*
27. Pteris tremula, *R. Br.*
28. Lomaria procera, *Spr.*
29. Lomaria lanceolata, *Spr.*
30. Doodia caudata, *R. Br.*
31. Asplenium flaccidum, *Forst.*
32. Asplenium difforme, *R. Br.*
33. Asplenium polyodon, *Forst.*
34. Asplenium obtusatum, *Forst.*
35. Asplenium lucidum, *Forst.*
36. Nephrodium decompositum, *R. Br.*
37. Polystichum aristatum, *Presl.*
38. Hypolepis tenuifolia, *Bernh.*
39. Phymatodes Billardieri, *Presl.*
40. Niphobolus rupestris, *Spr.*
41. Psilotum triquetrum, *Sw.*
42. Lycopodium Billardieri, *Spring.*

Descriptions of the New Species.

Coprosma petiolata, *H. fil.*; ramis cylindricis cortice pallido, ramulis petiolisque puberulis, foliis gracilè petiolatis elliptico-oblongis obovatisve obtusis subcoriaceis, stipulis transversè elongatis abruptè longè acuminatis, costis puberulis, floribus capitatis, pedunculis infra v. supra medium bracteolatis, fl. ♂ subsessilibus congestis, calyce brevissimo, corollâ latè campanulatâ profundè 4-fidâ, fl. ♀ 3–5 sessilibus, calycis limbo truncato, corollâ brevi cylindricâ breviter 4-fidâ, stylis crassis erectis.

C. Bauerianæ Ins. Norfolciæ et Nov. Zelandiæ similis, sed folia gracilius petiolata minus carnosa, et marginibus non aut vix recurvis.—Arbor parva, cortice lævi pallido. Folia 1–2 unc. longa, petiolo costâ venisque subtùs puberulis. Pedunculi puberuli, stricti v. curvi, petiolis æquilongi v. iis longiores, interdùm bifoliati. Flores ♂ plurimi, basi involucello brevi suffulti, ¼ unc. longi, alabastra subglobosa. Antheræ breviter oblongæ. Fl. ♀ pauciores, involucello longiore diphyllo suffulti.

Coprosma acutifolia, *H. fil.*; arborescens, ramis cortice lævi pallido tectis, foliis petiolatis membranaceis ovatis elliptico-ovatis ovato-lanceolatisve acuminatis, fl. ♂ ad apices pedunculorum solitariis binis ternisve subsessilibus; pedunculis simplicibus v. dichotomis, calyce minimo 4-lobo, corollâ infundibuliformi ad medium 4-fidâ, staminibus longè exsertis.

C. lucidæ, Forst., affinis, differt præcipuè foliis membrananceis.—Arbor parva, ramosa, cortice lævi pallido, ramulis gracilibus ultimis cylindricis. Folia 2⅓–2½ unc. longa, in petiolum ⅓ unc. longam angustata, penninervia, et reticulatim venosa. Pedunculi petiolis æquilongi v. iis longiores, dum divisi ad axillas stipulis connatis membranaceis instructi. Flores brevissimè pedicellati ⅓ unc. longi, ♂ tantum visi.

SCÆVOLA GRACILIS, *H. fil.*; procumbens, ramis herbaceis foliisque utrinque pubescenti-pilosis axillis villosis, foliis lanceolatis cuneato-lanceolatisve acutis irregulariter serrato-dentatis in petiolum elongatum angustatis, floribus in ramulis brevissimis axillaribus subsessilibus, foliis 4 lineari-lanceolatis floribus æquilongis bracteatis, calycis tubo brevi basi bracteolato, limbi lobis 5 inæqualibus, 3 subulatis, 2 intermediis brevibus, corollæ lobis angustis.

Calycis villosi tubus basi multibracteatus, sericeus, ¼ unc. longus, lobis valdè inæqualibus, 3 subulatis tubo corollæ ¼ brevioribus, 2 intermediis brevibus obtusis lobulatis. Corollæ flavidæ tubus lentè curvus, laciniæ tubo longiores, lineares, ligulatæ, acuminato-uncinatæ, supernè paulò dilatatæ, marginibus membranaceis undulatis, tubo intùs villoso supernè pilis capitatis opacis et secus basin limbi instructo. Stamina subæqualia, tubo corollæ breviora; filamenta filiformia, glaberrima; antheris linearibus muticis. Stylus pilosus. Stigma hemisphæricum, marginibus cupulæ ciliatis.

ASIMINA LANCEOLATA, *H. fil.*; arbuscula, foliis coriaceis petiolatis lanceolatis acuminatis grossè serratis subtùs glaucis, paniculis folio brevioribus.

A. lucidæ, H. fil., Novæ-Zelandiæ affinis, sed foliis lanceolatis longioribus et angustioribus, serraturis grossioribus apicibus curvis acutis. Folia 2–3 unc. longa, acuminata, basi in petiolum sensim angustata. Flores subimbricati.

Note on *Obolaria virginica*, L. By ASA GRAY, M.D., F.M.L.S. &c.—Extracted from a Letter to George Bentham, Esq., F.L.S. &c.

[Read April 15th, 1856.]

SEVERAL years ago, in a memoir* in which *Obolaria virginica* is figured and described, I endeavoured to show that this genus should be referred to the order *Gentianeæ*, *notwithstanding* a peculiarity in its placentation. I wish now to say, that it should be referred there *on account* of its placentation. Had I properly noted at the time what Grisebach states (in his *Gen. et Sp. Gentianearum*), respecting the ovules sometimes occupying several series somewhat remote from the sutures, or had I been led to inspect the ovary of almost any of our common Gentians, the case would have been clear at once. It is only recently that my former pupil, Mr. Henry J. Clark, has called my attention to the fact, hitherto unknown, I believe, that the ovules in most of our Gentians of the United States occupy the whole, or nearly the whole parietes of the ovary; sometimes in nearly definite rows, as in *G. quinqueflora*, but more commonly indefinitely crowded over

* Chloris Bor. Amer. in Mem. Amer. Acad. 1846.